CCGPS Frameworks Student Edition

Mathematics

First Grade Unit Four
Sorting, Comparing, and Ordering

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"Making Education Work for All Georgians"

Unit Four: Sorting, Comparing and Ordering

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OVERVIEW

In this unit students will:

- Develop an understanding of linear measurement.
- Measuring lengths as iterating length units.
- Tell and write time to hour and half hour.
- Represent and interpret data.

The measure of an attribute is a count of how many units are needed to fill, cover or match the attribute of the object being measured. Students need to understand what a unit of measure is and how it is used to find a measurement. They need to predict the measurement, find the measurement and then discuss the estimates, errors and the measuring process. It is important for students to measure the same attribute of an object with differently sized units.

Students need to make their own measuring tools. For instance, they can place paper clips end to end along a piece of cardboard, make marks at the endpoints of the clips and color in the spaces. Students can now see that the spaces represent the unit of measure, not the marks or numbers on a ruler. Eventually they write numbers in the center of the spaces. Encourage students not to use the end of the ruler as a starting point. Compare and discuss two measurements of the same distance, one found by using a ruler and one found by aligning the actual units end to end, as in a chain of paper clips. Students should also measure lengths that are longer than a ruler.

Have students use reasoning to compare measurements indirectly, for example, to order the lengths of Objects A, B and C, examine, then compare the lengths of Object A and Object B and the lengths of Object B and Object C. The results of these two comparisons allow students to use reasoning to determine how the length of Object A compares to the length of Object C. For example, to order three objects by their lengths, reason that if Object A is smaller than Object B, and Object B is smaller than Object C, then Object A has to be smaller than Object C. The order of objects by their length, from smallest to largest, would be Object A - Object B - Object C.

Although the units in this instructional framework emphasize key standards and big ideas at specific times of the year, routine topics such as counting, time, money, positional words, patterns, and tallying should be addressed on an ongoing basis through the use of calendars, centers, and games. Calendar instruction should be a part of daily mathematics instruction. Students should be able to determine the day before and after the current day, as well as identify the day after a particular passage of time.

Students are likely to experience some difficulties learning about time. On an analog clock, the little hand indicates approximate time to the nearest hour and the focus is on where it is pointing. The big hand shows minutes before and after an hour and the focus is on distance that it has gone around the clock or the distance yet to go for the hand to get back to the top. It is easier for students to read times on digital clocks, but these do not relate progression of time very well.

Students need to experience a progression of activities for learning how to tell time. Begin by using a one-handed clock (hour handed) to tell times in hour and half-hour intervals, then discuss what is happening to the unseen minute hand. Next, use two real clocks, one with the minute hand removed, and compare the hands on the clocks. Students can predict the position of the missing minute hand to the nearest hour or half-hour and check their prediction using the two-handed clock. They can also predict the display on a digital clock given a time on a one- or two-handed analog clock and vice-versa.

Have students tell the time for events in their everyday lives to the nearest hour or half hour. Make a variety of models for analog clocks. One model uses a strip of paper marked in half hours. Connect the ends with tape to form the strip into a circle.

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

MCC.1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

MCC.1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

STANDARDS FOR MATHEMATICAL PRACTICE

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education.

Students are expected to:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson*****

ENDURING UNDERSTANDINGS

- Telling time to the hour and half hour using analog and digital clocks.
- Objects may be compared according to length.
- Non-standard units of measure may be used to determine length.
- Tools may be created to measure length.
- Organize and represent data collected from measurement.
- Ask and answer questions related to measurement data.

ESSENTIAL QUESTIONS

- How can we measure the length of an object?
- What can we use to measure objects?
- How can we tell which of two objects is longer than the other?
- How can we order a group of objects by their length?
- How does using an object help us when measuring other object?
- Why are the measurements of classmates different?
- Why would an estimate be helpful when measuring?
- When is an estimate good enough? When should I measure instead of using an estimate?
- How can we compare the length of a set of objects?
- How are nonstandard unites used to measure objects?
- How are measuring units selected?
- How do measurements help compare objects?
- Why is telling time important?
- How do you use time in your daily life?
- How can we measure time?
- What does the hour hand on a clock tell us?
- Why is it important to know the difference between the two hands?
- Why do we need to be able to tell time?
- How do we show our thinking with pictures and words?
- How does time impact my day?
- What does the minute hand on a clock tell us?
- What do I know about time?
- Why do people collect data?
- Are there different ways to display data?
- What can we learn from our data?

CONCEPTS/SKILLS TO MAINTAIN

- Counting to 100

- Sorting
- Write and represent numbers through 20
- Comparing sets of objects (equal to, longer than, shorter than)
- One to one correspondence
- Equivalence
- Basic geometric shapes
- Modeling addition and subtraction
- Estimating using 5 and 10 as a benchmark
- Measurement: comparing and ordering two or more objects

SELECTED TERMS AND SYMBOLS

The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, teachers should pay particular attention to them and how their students are able to explain and apply them.

The terms below are for **teacher reference only and are not to be memorized by students**. Teachers should present these concepts to students using models and real life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

- **Analog**
- **Compare**
- **Data**
- **Digital**
- **Estimate**
- **Graph**
- **Hands (clock)**
- **Hour**
- **Length**
- **Minute**
- **Sorting rule**

STRATEGIES FOR TEACHING AND LEARNING

Developing understanding of linear measurement and measuring lengths as iterating length units.
MCC.1.MD.1 Order three objects by length; compare the **lengths** of two objects indirectly by using a third object.

Instructional Strategies

This standard calls for students to indirectly measure objects by comparing the length of two objects by using a third object as a measuring tool. This concept is referred to as transitivity.

Example:
Which is longer: the height of the bookshelf or the height of a desk?

Student 1:	**Student 2:**
I used a pencil to measure the height of the bookshelf and it was 6 pencils long. I used the same pencil to measure the height of the desk and the desk was 4 pencils long. Therefore, the bookshelf is taller than the desk.	I used a book to measure the bookshelf and it was 3 books long. I used the same book to measure the height of the desk and it was a little less than 2 books long. Therefore, the bookshelf is taller than the desk.

It is beneficial to use informal units for beginning measurement activities at all grade levels because they allow students to focus on the attributes being measured. The numbers for the measurements can be kept manageable by simply adjusting the size of the units. Experiences with informal or nonstandard units promote the need for measuring with standard units.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

Instructional Strategies

This standard asks students to use multiple copies of one object to measure a larger object. This concept is referred to as iteration. Through numerous experiences and careful questioning by the teacher, students will recognize the importance of making sure that there are not any gaps or overlaps in order to get an accurate measurement. This concept is a foundational building block for the concept of area in 3rd Grade.

Example:
How long is the paper in terms of paper clips?

Measurement units share the attribute being measured. Students need to use as many copies of the length unit as necessary to match the length being measured. For instance, use large footprints with the same size as length units. Place the footprints end to end, without gaps or overlaps, to measure the length of a room to the nearest whole footprint. Use language that reflects the approximate nature of measurement, such as the length of the room is about 19 footprints. Students need to also measure the lengths of curves and other distances that are not straight lines.

Tell and write time

MCC.1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

Instructional Strategies

This standard calls for students to read both analog and digital clocks and then orally tell and write the time. Times should be limited to the hour and the half-hour. Students need experiences exploring the idea that when the time is at the half-hour the hour hand is between numbers and not on a number. Further, the hour is the number before where the hour hand is. For example, in the clock below, the time is 8:30. The hour hand is between the 8 and 9, but the hour is 8 since it is not yet on the 9.

Represent and interpret data

MCC.1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Instructional Strategies

This standard calls for students to work with categorical data by organizing, representing and interpreting data. Students should have experiences posing a question with 3 possible responses and then work with the data that they collect. For example:
Students pose a question and the 3 possible responses: *Which is your favorite flavor of ice cream? Chocolate, vanilla, or strawberry?* Students collect their data by using tallies or another way of keeping track. Students organize their data by totaling each category in a chart or table. Picture and bar graphs are introduced in 2nd Grade.

What is your favorite flavor of ice cream?	
Chocolate	12
Vanilla	5
Strawberry	6

Students interpret the data by comparing categories.
Examples of comparisons:

- What does the data tell us? Does it answer our question?
- More people like chocolate than the other two flavors.
- Only 5 people liked vanilla.
- Six people liked Strawberry.
- 7 more people liked Chocolate than Vanilla.
- The number of people that liked Vanilla was 1 less than the number of people who liked Strawberry.
- The number of people who liked either Vanilla or Strawberry was 1 less than the number of people who liked chocolate.

COMMON MISCONCEPTIONS

Some students may view the measurement process as a procedural counting task. They might count the markings on a ruler rather than the spaces between (the unit of measure). Students need numerous experiences measuring lengths with student-made tapes or rulers with numbers in the center of the spaces. Students are not expected to read a standard ruler in first grade, but should be familiar with a variety of non-standard measurement tools.

"If students actually make simple measuring instruments using unit models with which they are familiar, it is more likely that they will understand how an instrument measures… If students line up physical units, such as paper clips, along a strip of tag board and mark them off, they can see that it is the *spaces* on rulers and not the marks or numbers that are important…It is essential that the measurement with actual unit models be compared with measurement using an instrument. A chain of paper clips can be used as ruler to make this transition more apparent. Without this comparison, students may not understand that these two methods are really two means to the same end." (Van de Walle & Lovin 2006)

EVIDENCE OF LEARNING

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- compare objects by measuring length
- estimate the length of an object
- use non-standard units of measure
- use non-standard measurement tools to measure objects
- tell time to the nearest hour and half hour on a digital and analog clock
- know how the movement of the minute hand affects the movement of the hour hand on a clock
- sort objects by attributes
- identify sorting rule
- represent and interpret data
- identify how many more and how many less

TASKS

Scaffolding Task	Constructing Task	Practice Task	Performance Tasks
Tasks that build up to the constructing task.	Constructing understanding through deep/rich contextualized problem solving tasks	Games/activities	Summative assessment for the unit.

Task Name	Task Type/ *Grouping Strategy*	Content Addressed
How Long is Your Name?	Scaffolding Task *Whole and small group*	Measuring Length; Represent and interpret data
How Many Hands?	Constructing Task *Whole Group/Partners*	Measuring length
How Big is a Foot?	Constructing Task *Large group*	Measuring length
Groundhog's Garden	Practice Task *Whole Group/Individual*	Measuring length, ordering and comparing
What Shape Are You?	Practice Task *Whole Group/Partner*	Measuring length Represent and interpret data
It's Time – Part I: Using a Number Line	Scaffolding Task *Whole group*	Time as linear measurement, AM and PM
It's Time, Part II	Constructing Task *Large or small group*	Movement of clock hands
It's Time, Part III	Constructing Task *Whole Group*	Telling time (hour and minute hand)
Time for Bed	Performance Task	Data, graphing, telling time to hour/half hour
Culminating Task: Measurement Olympics	**Culminating Task** *Individual/Small Group*	Measuring Length and Time Represent and interpret data

SCAFFOLDING TASK: How Long is Your Name?

Approximately 2 days *Adapted from Name Trains by Vicki Bachman*

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
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4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have had many practice opportunities in kindergarten to compare two objects and use describing words to identify which of the two objects is longer or shorter than the other. For this activity, they should apply that knowledge of how to compare two objects on a larger scale by comparing their name to a group and then to a larger set, their class.

ESSENTIAL QUESTIONS

- How can we measure the length of an object?
- How does using an object help us when measuring other objects?
- How can we tell which of two objects is longer than the other?
- How can we order a group of objects by their length?
- Why are the measurements of classmates different?

MATERIALS

- Linking cubes, enough for each letter of each student's first name
- Dot stickers, enough for each letter of each student's first name
- "How Long is My Name?" Recording Sheet

- *Chrysanthemum,* by Kevin Henkes (or a similar book about names)

GROUPING

Whole Group/ Small Groups

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I

Begin the lesson by discussing with students the ways in which we measure objects each day in our own lives. Make a list together. After brainstorming objects that can be measured, read a book similar to *Chrysanthemum,* by Kevin Henkes. Ask students, "Have you ever thought of measuring a name? How might we measure our own names?" Allow for student responses and then show them how to create name chain using your name. Print the letters of your name on dot stickers and attach each sticker to a linking cube. Link all of the cubes together and show students that you have created a name chain. Have students think about whether or not their name will be longer, shorter, or the same length as yours. Have students record their thinking in their math journal and tell them that they will refer to their predictions later in the lesson.

Part II

Assign students to groups of three. Review and post the following directions:

1. With cubes, make a name chain that shows your name.
2. Compare your name chain with the members of your group. Decide whose name is shorter, longer, or the same length.
3. Complete the recording sheet.

As groups are working, circulate the room and ask questions of members of each group such as:

- *What is the length of your name?*
- *Are there any of you with same-length names?*
- *Do any of you have the same length of name as I do? Shorter or longer?*
- *How does your name compare with the names of the other members in the group?*

Part III

Once all groups have compared their names to the other students' names within the group, have them return to a common area with their recording sheets. Make a table on the board that lists the possible number of letters in a name, starting from the fewest number of letters to the maximum number of letters in a student's name in the class. For each category, have students raise their hand to indicate the number of letters in their name. See example below:

3 letters	5 letters	6 letters	7 letters	11 letters
Ava	Layla Nelly Caden Kayla	Lauren Preston Travis Radeta Olivia	Madison William Jillian	Christopher

Once all names have been listed within the chart, have students complete the second recording sheet. As students are working, ask questions such as:

- *Does anyone have a name that is as the same length as mine?*
- *Who has the longest name?*
- *Is it longer than mine? How much longer?*
- *Who has the shortest name in the class?*
- *What is the most common length in the class?*

As students finish the recording sheet, have students write a comparison sentence using the class data on the back of their recording sheet or in their math journal to be shared during the closing of the activity.

Part IV

Once all students have completed the second recording sheet, have them gather again in a common area for a class discussion of the data. Lead students to discuss the information they discovered about the names in the class through this task and allow them to share the comparison sentences they developed on the back of their sheet or in their math journal.

FORMATIVE ASSESSMENT QUESTIONS

- Who has the longest name?
- Who has the fewest number of letters in their name in the class?
- What is the length of your name?
- What is the most common length name in the class?

DIFFERENTIATION

Extension

- Have students compare the lengths of their first and last name.

Intervention

- For students who have difficulty with organization, have them cut out the letters of their name and glue to their recording sheet along with the names of their group members to compare.

Name:_____ Date:_____

How Long is My Name?

After making your name chain, write each letter of your name and your partner's names in each box.

Partner 1											
Partner 2											
Partner 3											

Order the names from fewest number of letters to greatest number of letters:

1._____

2. _____

3. _____

Write a comparison sentence using one of the following phrases: longer than, shorter than, or equal to.

_____

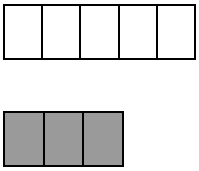
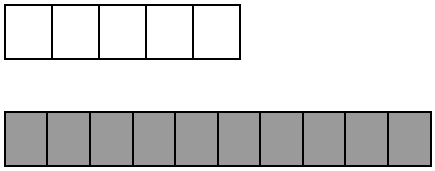
_____

_____

Name:_____ Date:_____

Comparing Names

My name is _____.
There are _____ letters in my name.

Shorter	Equal	Longer
		
Write the names of students whose name is shorter than yours.	Write the names of students whose name is the same length as yours.	Write the names of students whose name is longer than yours.

Which student in the class has the longest name?_____

Which student in the class has the shortest name?_____

How many students have a name that is the same length as your name?_____

CONSTRUCTING TASK: How Many Hands?

Approximately 2-3 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

"It is useful to measure the same object with different-sized units. Results should be predicted in advance and discussed afterwards. This will help students understand that the unit used is as important as the attribute being measured. The fact that smaller units produce larger numeric measures, and vice versa, is hard for young children to understand." (Van de Walle & Lovin 2006)

ESSENTIAL QUESTIONS

- How can we measure the length of an object?
- How can we tell which of two objects is longer than the other?
- How can we order a group of objects by their length?
- Why are the measurements of classmates different?
- Why would an estimate be helpful when measuring?
- When is an estimate good enough? When should I measure instead of using an estimate?

MATERIALS

- Paper for tracing hands

- Sentence strips or strips of tag board
- Various classroom items to measure
- "How Many Hands?" recording sheet (copied twice, front to back)
- *How Tall, How Short, How Far Away?,* by David Adler or similar book

GROUPING

Whole Group/Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Begin the lesson by reading a book similar to *How Tall, How Short, How Far Away?,* by David Adler (or similar measurement story.) Discuss with students the ways in which measuring objects has occurred over time.

Part I
Tell the class they need to measure the width of the classroom. Explain that this means how wide our classroom is from one side to the other. Together, write a list of objects you could possible use. (desks, pencils, etc.) First, use many of the objects-3 desk, 4 kids, 6 pencils, etc, all at once. Ask the class if this is a good measurement. *Why or why not? What if we just try one?* Then, choose one object and make a prediction. How many _____ will it take to get from one side to the other? Discuss. Check prediction. Record results on the board. Do this again with other nonstandard units. Discuss why the amounts are changing depending on the tool.

Part II
After the story, students trace their hand, cut it out and use it as a non-standard unit of measure to measure items in the classroom. Students will estimate the number needed to measure an object before measuring. Using the copy of their own hand, ask students to estimate the length and height of an item in the classroom. Have students record their estimates in crayon on the recording sheet. Emphasize reasonable estimations and model how you estimate. Then, using a cut out of the teacher's hand, measure the item and record the actual measurement on the recording sheet.

Brainstorm a list of at least 10 items for students to estimate and then measure using their own hands. Record this list on the board or chart paper. Pair up students. Pairs of students should select the same 5 items from the list to measure using their own hands as a reference. Be sure to have them estimate first (writing this in crayon) and record their estimations on their own recording sheet. Students should then use their own hands to measure the items they've selected in the class and each student should fill out their own recording sheet.

Be sure to ask each group of students if they measured using the length or the width of their hand. Encourage them to give reasons to support one way over the other but do not discourage them from choosing a particular way. However, make sure to discuss how this might affect their results.

Students will then need to compare their actual measurements with their partner's measurements and answer the comparing question from their recording sheet. Also, have the students place the items they measured in order from longest to shortest or vice-versa. After all groups have completed their recording sheet, take time to share results with the entire class. In addition to sharing the results of their measurements, lead students in a discussion about the unit they used to measure each object with. Use the following questions to lead your discussion:

- *What difficulties did you face using only one unit, your hand print, to measure each object?*
- *What might make it easier for you to measure the next time you measure these objects?*
- *What did you notice about the measurements you determined and those that your partner determined?*

Part III

Once you and your students have discussed the differences between measurements among the students and the difficulties faced using only a single unit, lead students in a discussion of the possibility of creating a measurement tool that has multiple units. Ask questions to probe their thinking such as, "*How would this make measuring objects easier?", "How many units should be on a measuring tool?", "Why?"* Once students have explained their thinking and justified their answers, explain to them how to make a measuring tool. Have each student trace their hand again to make five copies. Have them glue each handprint to a sentence strip and demonstrate for them how to use the new tool to measure objects. Then, have students complete the same activity again using another copy of the recording sheet. Once all students have finished, ask them write in their math journal. Have them compare their results from using only one unit of measure to using a measuring tool to measure the objects. Have students answer the following questions in their journal entry:

- How did you measure the length of each object?
- What did you notice about using a single handprint compared to a set of five handprints?
- Did your measurements change once you used a measurement tool? How?

After students have had a sufficient amount of time to complete their entries, allow them to share with the whole group.

FORMATIVE ASSESSMENT QUESTIONS

- Are students able to describe how they are measuring the length of an object?
- Can students determine which of two objects is longer?
- Are students able to order a group of objects by their length?

DIFFERENTIATION

Extension

- Students will compare the measurement of three classroom objects with someone else in their class. Ask students to answer the question, "Who is…?" Then ask students, "Who has the largest hand, you, your partner, or the new person?" Explain how they know. Assist students in creating a graph comparing their results.

Intervention

- Have the student put together unifix cubes, approximating the same length as their hand. Use the unifix cubes in place of the handprint.
- The teacher can place a strip of masking tape along the objects to help identify the measuring path.
- Allow students to dictate their journal entries to an adult or a capable student so that their math thinking is recorded.

Name _____ Date:_____

How Many Hands?

Classroom Item	My Estimate	Actual Number
1)		
2)		
3)		
4)		
5)		

What did you notice about your measurements and your partner's measurements? _____

_____

Order the objects above and explain how you ordered them.

-
-
-
-
-

_____

_____

_____

CONSTRUCTING TASK: How Big is a Foot?

Approximately 2 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

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STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
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3. Construct viable arguments and critique the reasoning of others.
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5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should be familiar with using measuring tools. They should be able to measuring an object correctly by placing the non-standard tool at the base or end of an object. When using multiple nonstandard objects, each object should be placed end to end without overlapping or gaps. There should be a common understanding that while students may each use a common unit, for example their own foot, they may find that their results differ.

ESSENTIAL QUESTIONS

- How can we measure the length of an object?
- How can we tell which of two objects is longer than the other?
- How can we order a group of objects by their length?

MATERIALS

- Paper for tracing feet
- *How Big Is a Foot?* by Rolf Myller or similar book
- "How Big is Foot" Student Task Sheet (copied twice, back to back, per student)
- Sentence strips or strips of tag board

GROUPING

Whole group/Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Read the book, *How Big Is a Foot?,* by Rolf Myller (or similar book.) Have students trace around their shoe and cut use their cut-outs to measure how many of their personal "feet" it takes to get from one place to another. Making several copies allows students to see why it is important to use the measurement tool back to back and not leave big gaps when measuring. You can also have students practice walking the rug, or the length of tables by walking heel to toe, heel to toe, to help them see this.

Allow students time to measure several distances with their "feet", then, as a class, use a cut-out of the teacher's foot (that has already been cut out and reproduced) to measure the same distances. Students may also graph their results on chart paper. Talk about why there is a difference between the number of feet used to measure distances using different students' feet and using the teacher's foot.

Part II
Next, students should choose 5 items from the classroom to measure. They must estimate the number of "feet" first; measure the item next, and then record the actual measurement on the recording sheet. Also, have the students place the items they measured in order from longest to shortest or vice-versa. This could be recorded on their student task sheet. While students are measuring, ask the following questions about their findings:

- *Which of the two objects is longer than the other?*
- *Show me how to put these in order.*
- *Why do other students have different measurements than you for the same item?*
- *What will you do for objects longer than your feet?*
- *Is it important to put the "feet" end to end? Why?*

After all groups have completed their recording sheet, take time to share results with the entire class. Be sure to ask each group of students if they measured using the length or the width of their foot. Encourage them to give reasons to support one way over the other but do not discourage them from choosing a particular way. However, make sure to discuss how this might affect their results.

Part III
Review the previous lesson, *How Many Hands?*, with the students. Ask them to share what they remember about using a measurement tool versus only one unit of measure (a single handprint). Ask, *"What are the drawbacks to using only one unit of measure to determine the length of an object?"*, *"How might using only one unit affect your findings?"* Ultimately, you want students to discover through the previous activity and the current task that using only one single unit is not efficient. Have them create a measurement tool using their "feet" by tracing their feet again to create a measurement tool of "5 feet". Students could glue their footprints to sentences strips or tape each footprint, toe-to-heel, in groups of five to create a non-standard measurement tool. Once each student has created a tool, have them re-measure the same objects and record their findings on the second recording sheet.

Once students have completed the task with their measurement tool, have them answer the following question in their math journals:
- *What is an efficient method of measuring an object? Why?*

FORMATIVE ASSESSMENT QUESTIONS

- What will/did you do when the item was longer or further than the number of "feet" you had, what did you do to figure out an answer?
- Which do you prefer to use to measure, a single footprint or your measurement tool of "5 feet"? Why?
- How are you able to determine which the objects you have measured are longer than the other?

DIFFERENTIATION

Extension
- In pairs have students talk about how they could standardize their feet so that all measurements are the same. For instance, perhaps the classroom bookshelf measured 4 of Aly's feet but 3 of Zak's feet. Ask the students, "How can we make it so Aly and Zak got the same measurement instead of a different ones?" "Why would this be an important thing to do?"

Intervention
- Have students dictate to you their math thinking for their journal entry.
- For students who have fine motor difficulties, give students precut footprints to use so that all of them are the same size, rather than requiring them to cut out the footprints.

Name _____ Date:_____

How Big Is a Foot?

Object to be Measured	My Foot Estimate	My Foot Measurement	Was my estimate close? Put an x in the box	
			Yes	No

PRACTICE TASK: Groundhog's Garden

Approximately 2 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have an understanding of nonstandard units of measurement and have multiple experiences measuring objects using direct comparison and non-standard measurement tools.

ESSENTIAL QUESTIONS

- What can we use to measure objects?
- How can we measure the length of an object?
- How can we compare the length of a set of objects?
- How can we order a group of objects by length?

MATERIALS

- One copy of flower sheet per student
- Worms or ladybugs measuring tool sheet (each sheet has tools for two students)
- *How Groundhog's Garden Grew*, by Lynne Cherry, or similar text
- "Groundhog's Garden" Recording Sheet

GROUPING

Individual

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Begin the lesson by reading, *How Groundhog's Garden Grew*, by Lynne Cherry (or similar story.) Discuss the different plants in the story, and how you might go about measuring them. How could you measure flowers if Groundhog planted a flower garden?

Next, have students cut out the single ladybug and the single worm on the task sheet. Have students practice measuring each flower using each object. After students have had time to measure each one using each single unit, lead them in a discussion about how much easier it is to use a measuring tool, rather than a single unit. Ask them to compare the previous tasks and the level of success they felt they had using the tools they created versus the frustrations they may have had using the single units (single handprint and footprint). Once students recognize the need for a measurement tool, move on to part II.

Part II
Task Directions
Each student will have a bag of flowers and a measuring tool - either worms or ladybugs.

1. The student will choose 5 flowers to measure.
2. They will record an estimate first before measuring with their ladybugs or worms.
3. Have the students measure the length of the flower card.
4. Record measurements on the recording sheet.
5. The student will paste the flowers in an order that makes sense to them onto the back of their recording sheet.
6. The student will explain what they discovered while measuring flowers and describe how the flowers were ordered.

Part III
To extend students' experiences using nonstandard measurement tools and to emphasize the need for using a measurement tool, have students engage in the activity, "*Guess and Measure*". (Van de Walle, Activity 8.5, page 231) Make a list of things in the room to measure. Have students make a row or chain of exactly ten units (allow them to choose from a set of materials) to use in helping measure the object. First, have them estimate the length of the object to be measured and then lay the measuring tool against the object to record an actual measurement. Once all students have completed the activity, have them share their measuring tool and explain why they chose the units they selected. *How did their measurements compare to those other students determined? What factors may have caused their results to differ?*

FORMATIVE ASSESSMENT QUESTIONS

- How did you order the flowers and why did you choose to do it in that way?
- (When measuring the flowers) Show me where you are putting your measuring tool.
- What do you think your measurements would be had you chosen the other measuring tool? Why?

DIFFERENTIATION

Extension

- "Crooked Paths" (Van de Walle, Activity 8.3, page 229) Make several lines of masking tape on the floor for students to measure distances. Be sure to include distances that are curved and crooked, in addition to straight lines. Require students to estimate the measurement of each, predict which distance will be longer (or shorter) and then take an actual measurement using the tool of their choice.

Intervention

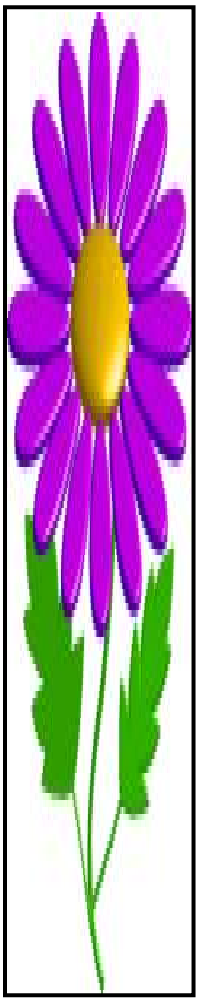
- Draw a line from the base of the flower to the top for students to use as a guide when measuring.
- "Guess and Measure" (Van de Walle, Actvity 8.5, page 231). See description above and modify by placing a piece of masking tape along the dimension of each object to be measured.

Flowers for Groundhog's Garden

Flower 1

Flower 2

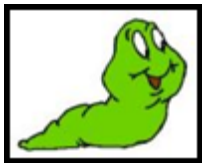
Flower3



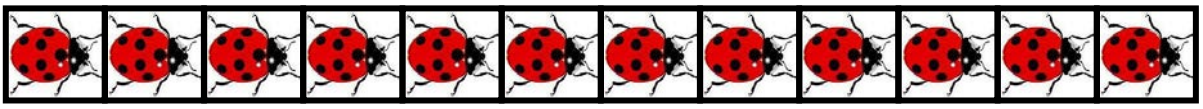
Flower 4

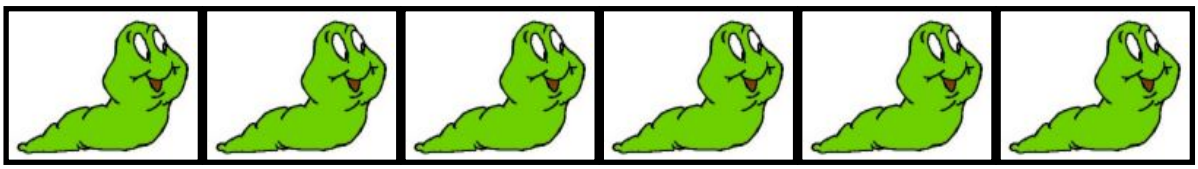
Flower 5

Flower 6



Cut out each measuring tool. Measure your flowers and record your results on the recording sheet.





Name _____ **Date:_____**

Flower Measurement Recording Sheet

Directions: Estimate the length of each flower below. Then measure and record the length of each flower below.

Flower Number	Estimate		Actual Measure	
	Ladybug	Worm	Ladybug	Worm
1				
2				
3				
4				
5				
6				

After recording the measurements for each flower, glue the flowers onto the back of this sheet in an order that make sense to you. Explain how the flowers are ordered:

_____

_____

_____

CONSTRUCTING TASK: What Shape Are You?

**Adapted from Are You a Square? By Marilyn Burns*
Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

MCC.1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have some understanding of appropriate units of measure in relationship to the size of the object being measured. Ex: It would not be efficient to measure the length of the white board using paper clips. More appropriate tools would include: outline of foot, textbook or an unsharpened pencil.

ESSENTIAL QUESTIONS

- How are nonstandard units used to measure objects?
- How are measuring units selected?
- How do measurements help compare objects?

MATERIALS

- Yarn (enough for each student)
- Various units of measure for students to choose from (various small and large tools for discussion in Part I)
- Sticky notes (enough for each student to have 1)
- Chart paper (1-2 sheets, see diagram in Part II)
- "What Shape Are You?" recording sheet (1 per pair of students)

GROUPING

Whole group/Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Students will work in pairs for this activity. They will measure each other's height and length of reach by using a piece of yarn. The teacher will need to model these measurements so that all the students are clear on the procedure. Then, they will decide on a measuring tool (from a set) to determine the number of units long their height and length of reach are. Once they have determined their "measurements" they will then decide which category they belong in (square, tall or wide rectangle) and place their sticky note on the chart.

Part II
Once everyone in the class has posted their findings, allow students to share their results. Then, graph the results and have a class discussion. Possible questions to pose include:

- *Which does our class have the most of? Tall or wide rectangles?*
- *How many squares does our class have?*
- *Do we have an equal amount of any shapes?*

Discuss the various measurement tools students chose to use. Ask students to explain why they chose the tool they used and ask students if they would be able to determine, based on the data they collected, who is the tallest (or shortest) in the class? Why or why not?

DIFFERENTIATION

Extension
- Students will cut a piece of string, equal in length to their foot, with a partner. Then, they will explore ratios on their body such as: number of "feet" their height is, foot length: forearm, or foot: length of reach.

Intervention

- You may want to provide a large nonstandard unit of measurement for the student to use when measuring his or her height or length of reach, so that organization is less of an issue.

- *Who is taller than _____?* Students will stand back-to-back with the other students and determine if they are taller than, the same as, or shorter than each classmate. As they identify which of those they are in relation to each student, they will record the information on a task sheet. After all data is collected, the student will answer questions about the data, such as: *Are you taller or shorter than most students in the class? How many students are the same height as you?*

What Shape Are You? Recording Sheet

Partner 1: _____

Unit of measurement used: _____

Length of reach (left fingertip to right fingertip):_____

Length of height (top of head to bottom of feet):_____

Partner 2: _____

Unit of measurement used: _____

Length of reach (left fingertip to right fingertip):_____

Length of height (top of head to bottom of feet):_____

What Shape Are You Recording Sheet

Partner 1: _____

Unit of measurement used: _____

Length of reach (left fingertip to right fingertip):_____

Length of height (top of head to bottom of feet):_____

Partner 2: _____

Unit of measurement used: _____

Length of reach (left fingertip to right fingertip):_____

Length of height (top of head to bottom of feet):_____

SCAFFOLDING TASK: It's Time, Part I: Using a Number Line

Approximately 3-4 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND INFORMATION

Another variation on teaching students how to tell time on the clock is by using the number line. The number line is a useful way to help students understand the movement of the hands of the clock. Also, connecting the number line and the clock is helpful in developing student's number sense.

It is important to note that *am* and *pm* are discussed within this task. It is not part of the first grade standards for students to master this concept and they are not officially introduced to the concept of am and pm until 2nd grade. However, some discussion of *am* and *pm* is needed to build student understanding of the concept of time.

ESSENTIAL QUESTIONS

- What does the hour hand on a clock tell us?
- Why do we need to be able to tell time?

MATERIALS

- *It's Time: Part I* task sheet
- 12 sheets of cardstock or construction paper
- Brass fasteners (13)
- Markers
- 1 ruler
- Masking tape
- 1 piece of construction paper, cut into a triangle to tape to the tip of the ruler.

GROUPING

Whole Group/Individual

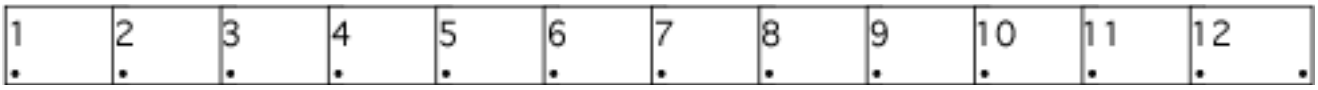
TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Gather students in a common area and discuss prior knowledge of a number line. Ask, "Do you know of any connections between a number line and telling time?" Introduce the important term, "Clockwise" and allow students to see the connection between the term and the direction of the moving hands on a clock.

Lead students in a discussion about am and pm. Encourage students to make the connection of each by explaining that the hands on a clock travel completely around the clock, twice, to make a full day (24 hours). The am hours represent one trip around the clock and the pm hours represent the second trip around the clock. Lead students to brainstorm activities that occur during these time periods by asking questions such as, "What are you doing at 3 am?" "What might your family be doing at 5 pm?"

Prepare to create two clocks by assigning each student an hour of the day and have the student illustrate an appropriate activity that might occur during that hour. If you have less than 24 students, you may need to assign some students more than one hour.

Part II
Once the illustrations are complete for each hour, ask the students to lay their hours in order. Ask them to take their illustration to the floor and place them, as a group, in an order that makes sense to them. The teacher should not influence where the students place their hours. More than likely, they will place their hours with like numbers. If this occurs, use this scenario to show the separation of am and pm. Ask the students to make a number line, using their illustrations. Discuss with the students that even though they are individual hours, they are all connected and complete a full rotation around a clock. Tell them that they are going to make two number lines to represent the hour hand traveling twice around the clock to complete a full day. Punch the lower left hand corner of each sheet and connect the hours with brass fasteners as you have this discussion.



As students are working together to create a number line that reflects hours in a day, listen to the conversations they have with each other. There may be some students who insist that the numeral 1 come first on the number line and others who insist that the 12 comes first. How are they able to justify their reasoning? The students may request that you help them settle the mathematical dispute, but try to encourage them to share what they know to teach each other. If this situation occurs, use questioning to help them explain their rationale for placing the 1 or 12 at the start of the number line.

Suggested questions include:

- *What do you know about the hours in a day that help you determine what number should go first?*
- *What do you know about a number line that helps you decide what number should go first or last?*
- *What experiences with time have helped you with this task?*

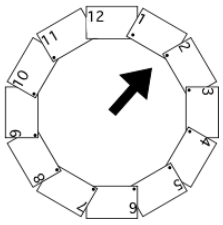
Once students are satisfied with the number lines they have created, allow each group to share their number line and explain to the other group how they determined the placement of each hour. Discuss the differences in each, if there are any, and clear up any misconceptions. Lead a class discussion using the following suggested questions:

- *Does this number line remind you of anything?*
- *Where should 12 be in this progression of numbers?*
- *What number comes after twelve on a number line?*
- *What number comes before one??*
- *What if I take these cards and rearrange them, and instead of putting them in a line, put them in a circle? What would this look like?*
- *Does this number line remind you of anything we have in our room or that you have seen on the wall?*

Once both groups have had the opportunity to share and you have lead a meaningful discussion of the number line as it relates to time, allow students to write in the math journal about their experience. Have them answer the following questions and allow them to share after they have all had time to reflect on the task:

- *Are there any differences between a traditional number line and a number line that represents time? If so, what are they?*
- *What is something new you learned today that you did not know before? Anything that surprised you?*
- *Is there anything that is unclear to you or that you would like more practice with?*

Next, connect and fasten the 12th and the 1st hour by arranging the cards in a circle. Connect a triangle to the tip of the ruler using masking tape. Explain to students that this will represent the hour hand for the clock.



Part III

Using the large class made clocks, give students several practice opportunities to make time. Line half of the class up at each clock. Explain to students that one student at a time, from each group, will

make time to the hour on the clock. (Ex. Heather is standing in line at one clock and Natisha is standing in line at the other clock. The teacher calls out "4:00". Each student makes the time on the clock using the hour hand. All students check to see if they are correct by showing thumbs up if they agree with the time made, or thumbs down if they disagree.). Continue giving practice opportunities until it seems that all students have developed proficiency making time to the hour.

Part IV

Once student demonstrate proficiency making time on a clock to the hour, call out an activity and allow students to determine the approximate time it would occur. Students should show the time on student geared clocks (Judy clocks or similar clocks). Have the students show the time on their clock. Call on students to justify their answers. Suggestions:

- Eat dinner
- Get dressed for school
- Attend baseball practice
- Sleep
- Dream
- Take a bath
- Read a book
- Have recess
- Eat lunch
- Write a story

Part V

Have students return to their seat to create a number line of their own, using time to the hour. Give each student the *It's Time Part I* task sheet and have them demonstrate their understanding of time as linear measurement and their ability to identify time to the hour on an analog and digital clock. Students will choose 5 things they love to do throughout the day and write the time on the analog clock and digital clock along with a short description of the event. They will then cut out each strip and glue them in order to create a number line. Allow students to share these with the whole group once all students have sequenced the events of their choosing.

FORMATIVE ASSESSMENT QUESTIONS

- How are a clock and a number line related?
- What differences are there in a regular number line and one that measures time?
- What types of activities would occur during the am hours? The pm hours?

DIFFERENTIATION

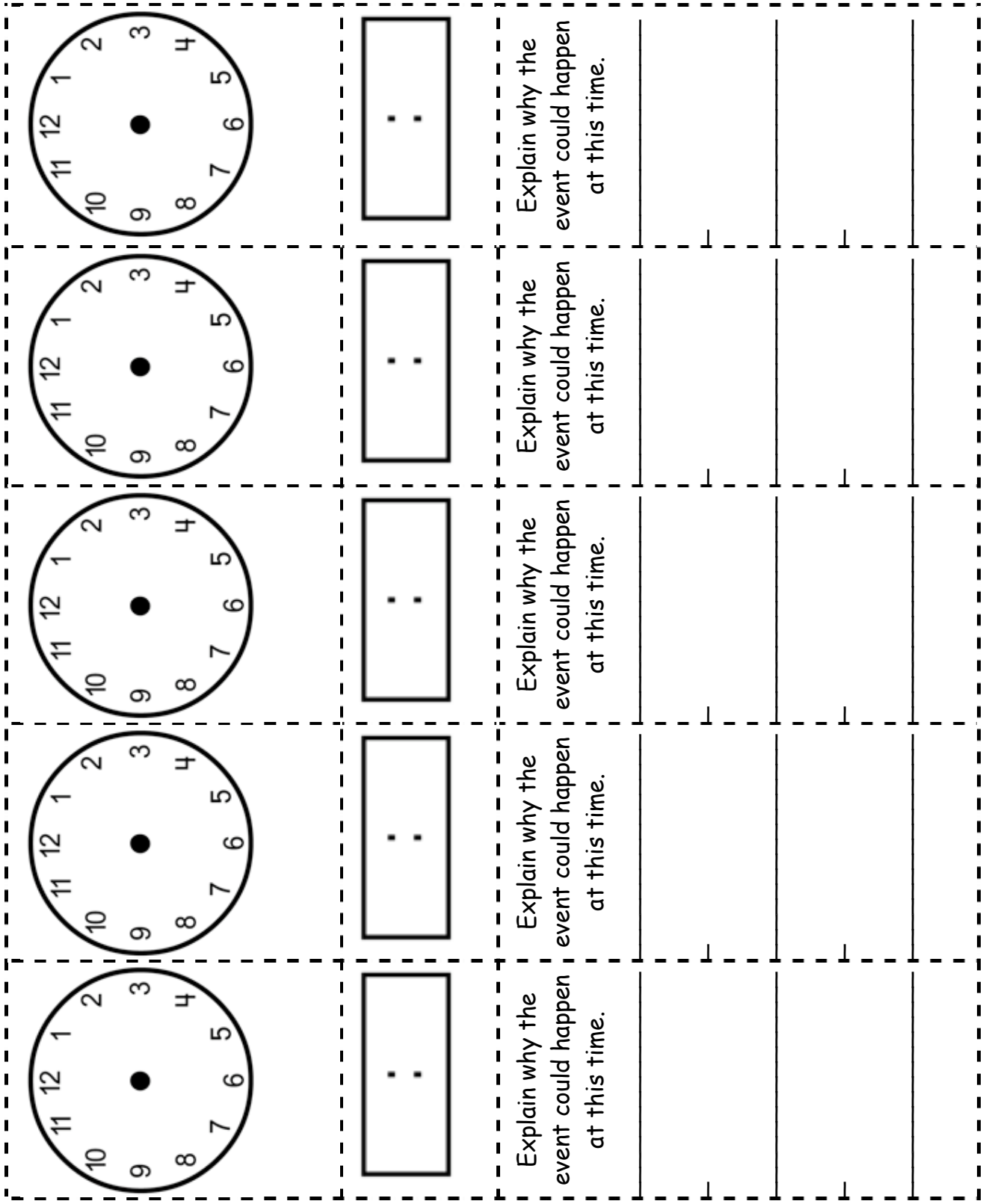
Extension

- Make several cards that have time to the hour in the form of an analog clock and a digital clock. On a long sheet of construction paper, draw an empty number line. Have students

place the cards correctly on the number line to reflect time. You could also include a short task sheet that requires them to answer questions about their number line, such as: *What hour comes before _____ ? After _____? "I started with ____ o'clock because I know that…"* Or have students write questions of their own for other students to answer.

Intervention

- Help the student create a "My Day Timeline" whereby s/he lists the events of his or her day, hour by hour, to attach meaning to the concept of time.



CONSTRUCTING TASK: It's Time – Part II

Approximately 3-4 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Children at this stage are usually shown the time set exactly to the hour or half hour. Be sure to show children that when the time is shown to the half-hour, that the hour hand is actually between the current hour and the next hour (for example: if the time is 4:30, the hour hand is set between the 4^{th} and 5^{th} hour.). This will help students understand the functions of the two hands on a clock. The little hand indicates an approximate time (nearest hour), and the big hand indicates time (minutes) before or after an hour. When we look at the hour hand, we focus on where it is pointing. With the minute hand, the focus is on the distance that it has gone around the clock or the distance yet to go for the hand to get back to the top (Van de Walle & Lovin 2006).

ESSENTIAL QUESTIONS

- What does the hour hand on a clock tell us?
- Why do we need to be able to tell time?
- What do the two hands on the clock tell us?

MATERIALS

- "It's Time!" Student clock sheet, one per student printed on cardstock
- "It's Time!" Student recording sheet (copy only 1 sheet per pair of students and cut in half)
- Brass fasteners (one per student)
- *The Grouchy Lady Bug* by Eric Carle, or similar book
- Flip book (one for each child), each page stamped with an analog clock face

GROUPING

Large or small group

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Prior to the lesson, set out a digital clock and an analog clock for display. Review with students the similarities and differences among each of the two clocks and ways in which we use them. Allow students to share where they have seen each of the two different types of clocks.
Tell students that you are going to make a clock much like an analog clock. Distribute the "It's Time!" task sheet and help each student make their own clock (Rather than giving them a clock with numbers already printed, allow students to write the numbers in the correct positions.) and attach the hour hand **only** with a brass fastener. Using approximate language, give students several opportunities to make the time to the hour on their clock (ex: "It's about 7 o'clock." "It's a little past 9 o'clock."). Ask these sample questions as you give students this practice opportunity:

- *What hour are we in now?*
- *How do you know we are still in the _____ hour?*

Part II
After practicing with clocks, read *The Grouchy Ladybug* and have students move the hand of their clocks to match the time in the story. Make sure to have the students notice and talk about how the display of time is different when the ladybug meets the whale (it shows time in 15 minute increments instead of hour increments, but students may not be aware of this.). Students may mention that the other hand, or minute hand, has moved. If the discussion does not naturally lend itself to discussion of the minute hand, use these questions as a guide:

- How did the movement of the clock hands change in this part of the story?
- What do you notice about the hands at each hour? What is the minute hand doing? What is the hour hand doing?
- What can happen during the duration of an hour or in one minute?

Give students "It's Time!" recording sheet with clock faces and an analog clock. Students should draw the hour hand on the clock faces and write the digital time to match the event described above each ladybug. Again, stress that the hour hand is the shorter hand and does not normally touch the numbers on the face of the clock that mark the hours.

Part III
Students will make a flipbook. In the flipbook they will write a time story similar to *The Grouchy Lady Bug*. Show students an example of a flipbook to give them an idea for their own time story. On the front will be the title, your name and an illustration (ex: The Busy Bee). Inside, students will draw/stamp a clock and draw the hands of the clock. The student will write a sequenced story like the one from *The Grouchy Ladybug.* In your example, be sure to continue to use approximate language (example: At about 6:00, the Busy Bee…), so that students will not always show the hour hand exactly on the hour, but in between hours as well.

FORMATIVE ASSESSMENT QUESTIONS

- *If the time was about ____ o'clock. Where would the hour hand be?*
- *I see that you started your story with ____ o'clock. What time will it be three hours in to your story?*
- *Since your story starts at ___ o'clock, what time of day does it start? What time of day will it end?*

DIFFERENTIATION

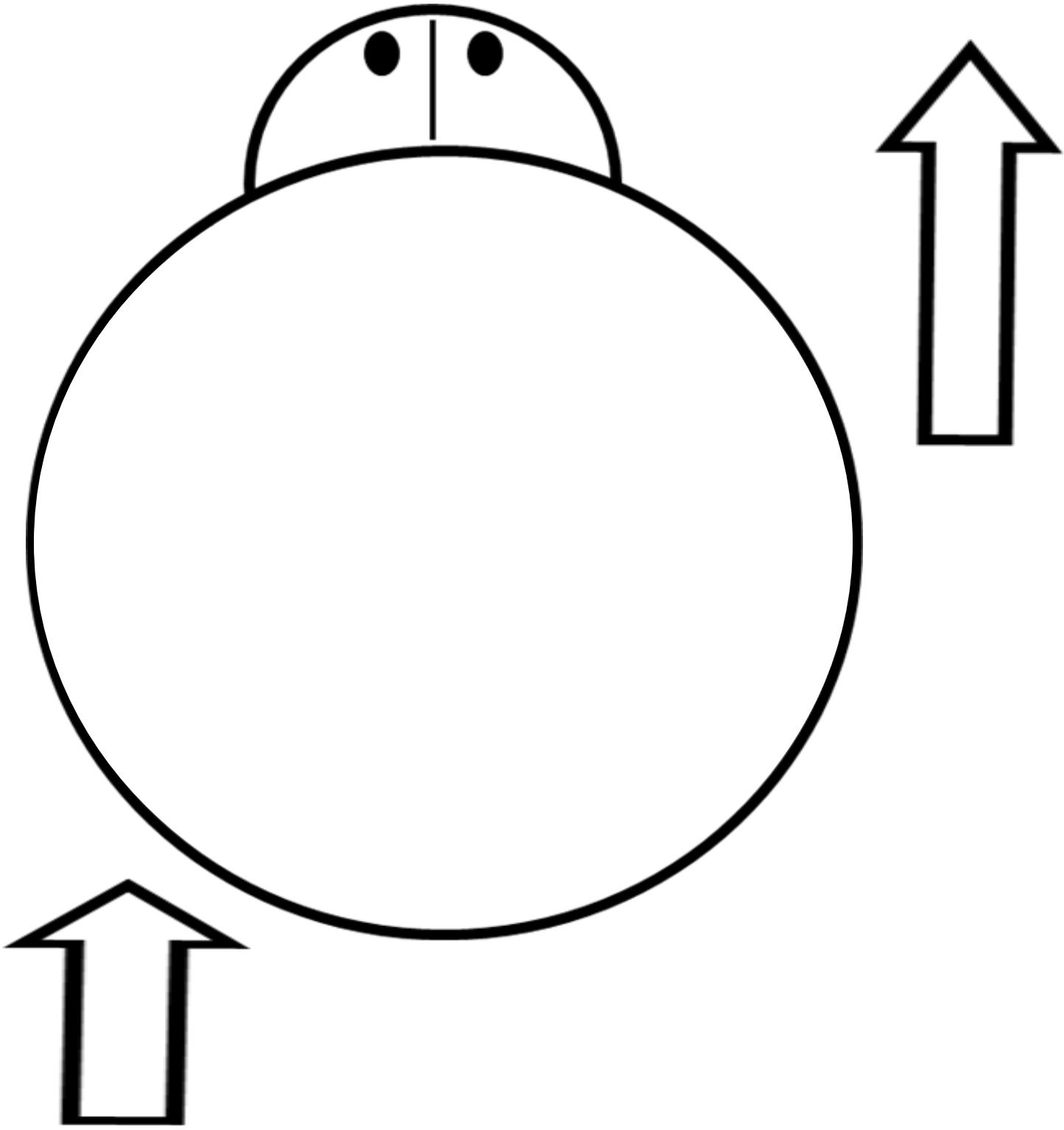
Extension

- Make a list of times that reflect a normal school day. Example: At 8:00, we listen to the morning announcements. At 9:00, we read together. Use these ideas to create a class book about time.

Intervention

- Have times and events recorded on index cards that the student can use as a guide when making their flipbook. Have the student put these in order according to the story.
- **"Favorite Time of the Day"** This could be done independently or in a center. Students will identify their favorite time, record that time on a printout of an analog and digital clock, and write to tell why that is their favorite time of day. You could also put these times in order and make a class book.

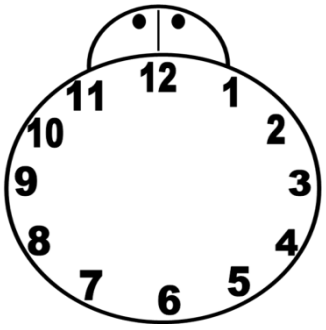
It's Time! (Part II)



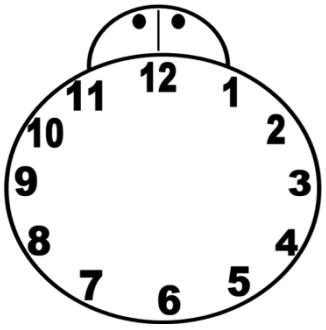
Name:_____ Date:_____

It's Time! Part II

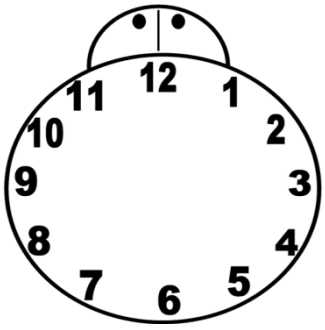
Breakfast



Lunch



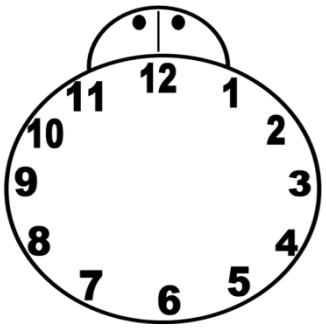
Dinner



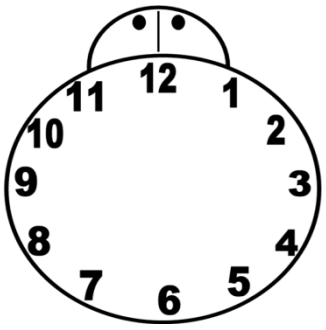
Name:_____ Date:_____

It's Time! Part II

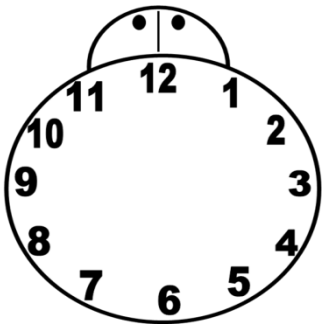
Breakfast



Lunch



Dinner



CONSTRUCTING/PERFORMANCE TASK: It's Time – Part III

Approximately 4-5 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND INFORMATION

Students should have an understanding of 5 as a benchmark number and have had experience with number patterns for this activity. They will also need to have a strong understanding of the role of the hour hand in order to develop an understanding of its relationship to the minute hand for this task. Duration of time is discussed within in this task, but it is not required by the standard for mastery. However, it is concept that will naturally be included in your conversations as you communicate the concept of a half-hour in relation to a whole hour.

ESSENTIAL QUESTIONS

- What does the hour hand on a clock tell us?
- What does the minute hand on a clock tell us?
- Why is it important to know the difference between the two hands?
- Why do we need to be able to tell time?

MATERIALS

- It's Time, Part III: Foldable Clock Templates
- Analog and Digital Clock Recording Sheet, 2 per student
- One paper plate, per student
- Markers
- Minute and hour hand for student clocks
- Brass fasteners (one for each student)
- *The Clock Struck One: A Time-telling Tale,* by Trudy Harris

- **GROUPING**

Large or small group

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Begin the lesson by gathering students in a common place. Read *The Clock Struck One: A Time-telling Tale*, by Trudy Harris (or similar time story.) Discuss the progression of the story over a 12 hour period.

Part II
Lead the students in a discussion of using 5 as a benchmark number. How does it make it easier to count using 5? What experiences have they had using groups of 5? Allow them to share their experiences, and then as a group count by 5's.

Part III
Review the number line that was created in *It's Time: Part I.* Refer to student examples from the previous task and discuss each. Next, review with students how many minutes are in an hour and then have students predict how many minutes are in half of an hour. Explain, if needed, that 30 is half of 60.

Make another number line using time to the hour, but leave an extra space in between each hour to include time to the half hour. Once the number line is displayed, ask students to predict what time they think will go in between each hour and to explain their reasoning. Lead students to an understanding that, at the midpoint between each hour, a half hour has passed. Write several examples of time to the half hour, in digital form, on an index card. Have student volunteers place the time card on the number line. As students are placing the time cards on the number line, emphasize that the time they are posting is halfway between the two hours. The discussion of the concept of time to the half hour needs to occur during this activity and not afterwards, so be sure to monitor students closely as they place the times, to address any misconceptions as they occur.

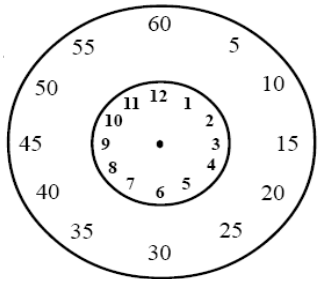
Give students the opportunity to demonstrate their understanding of the concept of a half hour being between two hours, by having them create a number line as they did in *It's Time: Part I.* Students will select events to display on a number line and assign a time that they would participate in each. They will write the time on the analog and digital clocks and write an explanation of the event. You can choose to have students select ten separate events or leave it open ended for those students who may have an understanding of duration of time to display one event starting at a half-hour and ending at the following half-hour or continuing across a few hours [For example, Elliott's game is scheduled for 9:30 and lasts an hour. She will display her number line to reflect her basketball game starting at 9:30 and continuing at 10:00, and ending at 10:30. OR, you may have some students who display two events within one hour (ex: Eating

lunch from 11:00-11:30 and Recess from 11:30-12:00), going to a movie at 5:00 that ends at 7:00, etc.].

There are multiple ways students could display their understanding of time for this activity, so only limit the number of events students could choose for the children who may be overwhelmed with the task of selecting appropriate events.

Part IV
Review the understanding of minutes, as units of 5, from the previous activity. Show students the foldable clock and explain that they will make one to practice time to the hour and half hour. Students will begin by making the clock face with dotted lines to represent the hours on the face of a clock. Each student will write the hour, starting with 1, in between the dotted lines (see pictures for clarification). Cut the tabs on the dotted lines. Next, they will write the minutes, in units of 5, in between the solid lines on the second clock face. Students should not cut the solid lines on the minute clock. Place the clocks with the hours on top of the clock face with the minutes (see example below).

Part V
To help with understanding the relationship between the minute and hour hands show students a paper plate clock constructed as follows:



The teacher will give all students one paper plate. Students will write the numbers for the minute hand on the ribbed edge of the plate and the numbers for the hour within the flat circular space in the middle of the plate. Have students cut out and attach the hour and minute hands with a brass fastener.

- Have the students skip count by fives at least up to sixty.
- Allow students to move the minute hand as they skip count by fives. Allow them time to practice moving both the hour and minute hands as they skip count. (Students should

understand that the reason they are doing this is because there are five minutes between consecutive integers on the clock face.)

- After students understand that there are sixty minutes in an hour, it is a good time for them to recognize the relationship between the hour hand's movement and the movement of the minute hand. This is a good time to reinforce on a demonstration clock that one full circle of the minute hand will cause the hour hand to move from one hour to the next.

Part VI

Allow time for students write in their math journal about number relationships and patterns they noticed during the lesson. After students have had a sufficient amount of time to record their thoughts, allow them to share their thinking with a partner and then with the class.

FORMATIVE ASSESSMENT QUESTIONS

- How do the minute and hour hands help us tell time?
- Does it matter which hand we read first?
- Why do we need to be able to tell time?

DIFFERENTIATION

Extension

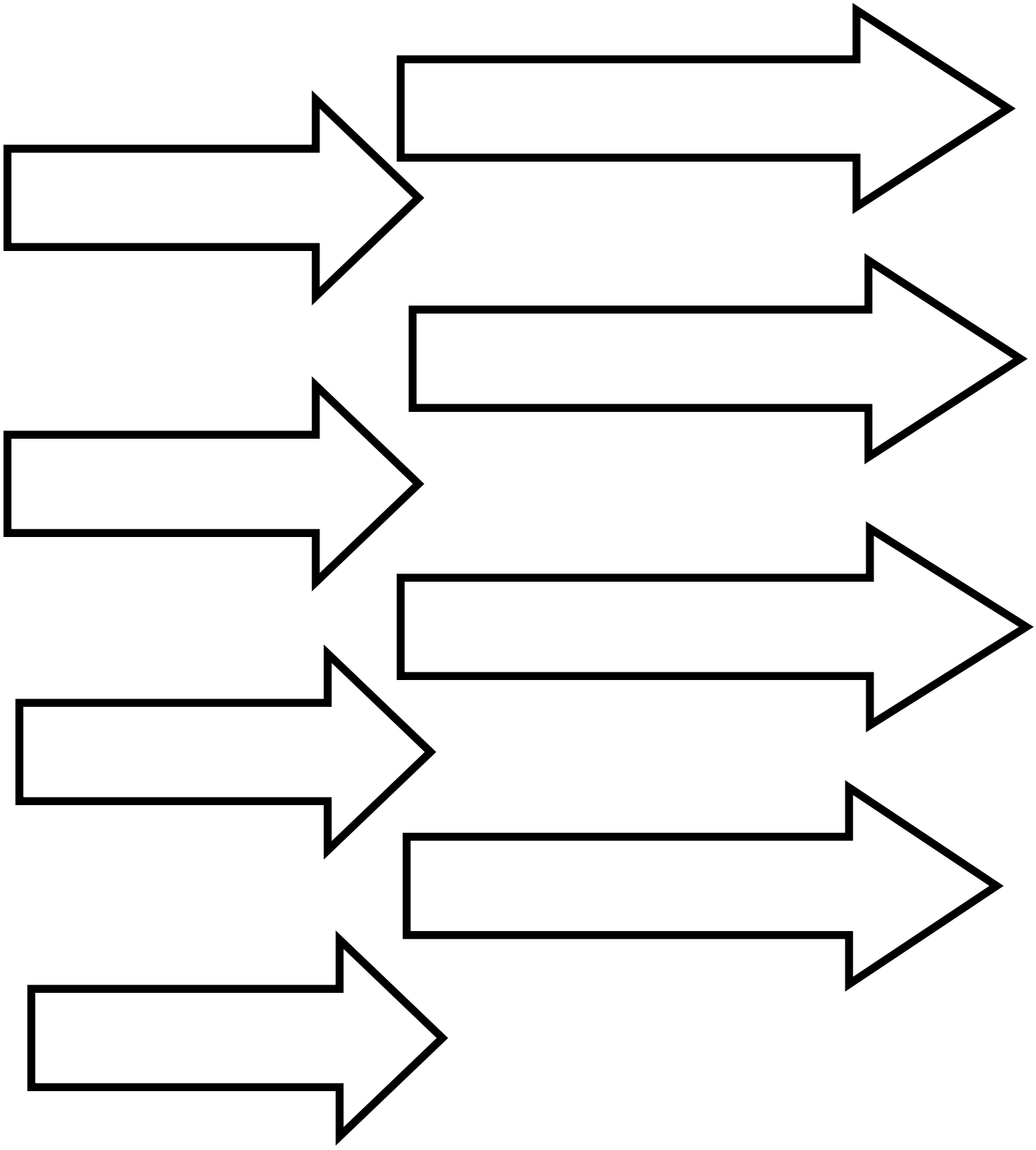
- Have the children make time cards using index cards. Create one card with an analog clock on it and then create a corresponding card with a digital clock. Make several examples like this and allow the children to play "Time Memory." All of the cards with the times on them, both analog and digital clock cards, will be mixed up and turned face down. They take turns turning 2 cards over at a time and try to find a match. For example, the analog clock will read 2:00 and the digital clock will say 2:00. If they get a match they get to keep the cards and go again. If they do not find a match, they turn the cards back over and their turn ends.

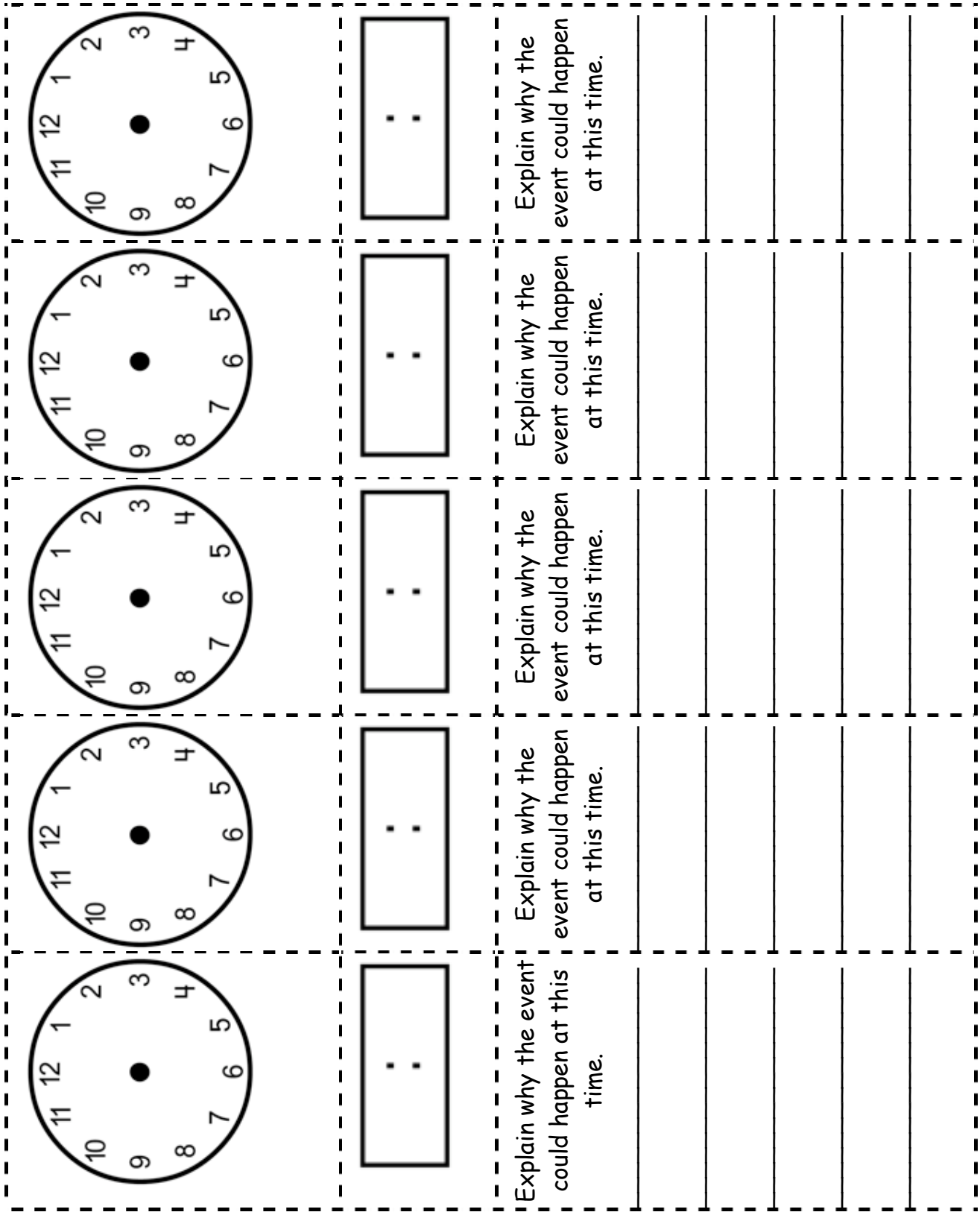
Intervention

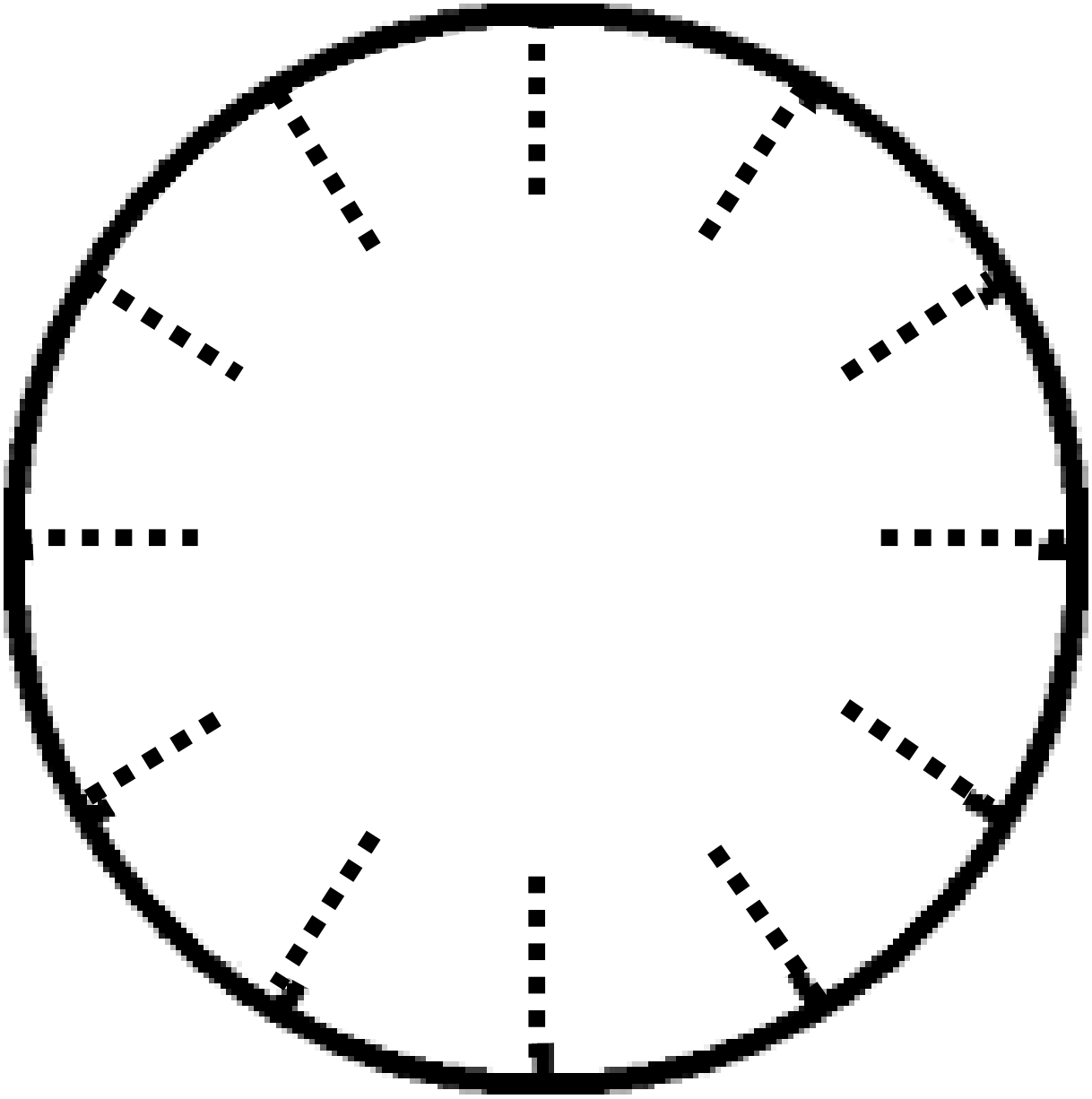
- For students who seem overwhelmed with the task of selecting events to add to their timeline, give them a set of 10 pictures representing daily activities and have them assign a time for each and place on a number line.

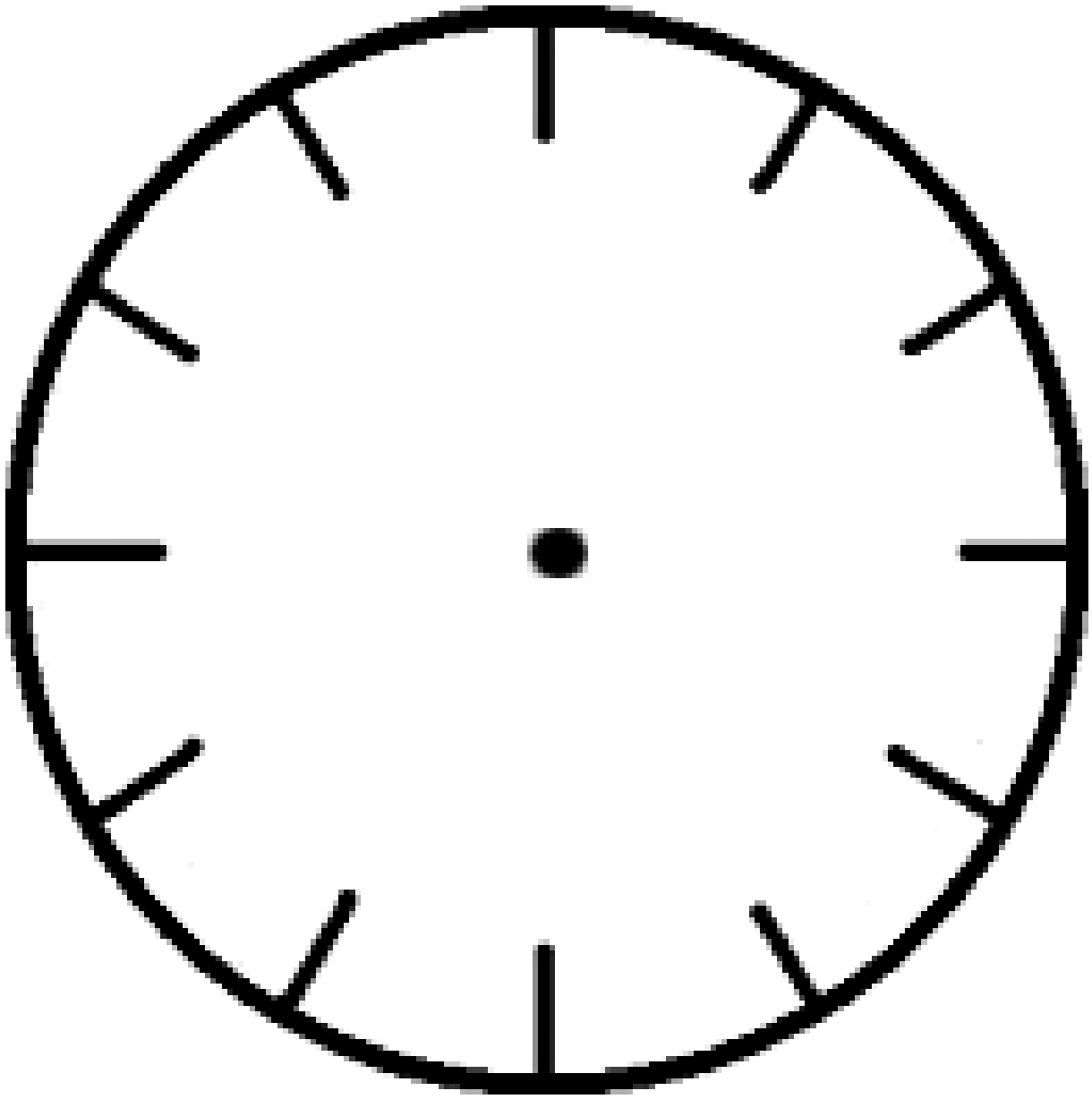
- In addition to giving students pictures to use as prompts, also make time cards for them to match to the pictures and then place on a number line.

It's Time-Part III (Clock Hands)









PERFORMANCE TASK: Time for Bed

Approximately 1-2 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Prior to this to this task, students should take home the "Time Survey" to complete for homework. All students will need to have this completed in order to have a sufficient amount of class data.

Although *am* and *pm* are mentioned in this task, this concept is not a standard for mastery until 2nd grade. However, it is an important concept to discuss when learning about time and necessary for building a strong understanding.

ESSENTIAL QUESTIONS

- Why do people collect data?
- Are there different ways to display data?
- What can we learn from our data?

MATERIALS

- "Time Survey" homework page
- **"**Time for Bed" and "Wake Time" census sheets (one for each student, copied front to back)
- *What Time is it Mr. Crocodile?*, by Judy Sierra or other similar time story

GROUPING

Large group, Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Begin lesson by reading *What Time is it Mr. Crocodile?* by Judy Sierra (or similar time story.) As you read the story, have students make the times from the story using their clocks or draw the times on the board.

Part II
Have students sit in a common area and review the differences between AM and PM. Tell students that they are going collect data on bed times and wake times of each student in the class. They will need to go to each student's seat and record on their census sheets each student's wake time and bed time.
Distribute the "Time Survey" page to each student. Ask them to place the sheet on their desk so that it is visible to other students as they collect data. Distribute census sheets for both wake time and bed time and allow students to collect and record the data.

Part III
Once students have collected their data, allow them time to analyze and organize their data on to their tally charts. Once they have completed the tally charts for bed time and wake time, allow them time to answer the questions related to their data. Once each student is finished, lead the class in a discussion of their findings.

FORMATIVE ASSESSMENT QUESTIONS

- What do you notice about your graph?
- What information do your charts give you?
- How is this information useful?

DIFFERENTIATION

Extension
- Students proficient in interpreting data could create their own questions for the data and have a partner respond.

Intervention
- Provide students with completed graph and have them respond to the questions.

Time Survey

Child's Name _____

Please circle one time for each:
My child's bedtime is: **7:30, 8:00, 8:30**, or **9:00**

My child wakes up at: **5:30, 6:00, 6:30**, or **7:00**

Time Survey

Child's Name _____

Please circle one time for each:
My child's bedtime is: **7:30, 8:00, 8:30**, or **9:00**

My child wakes up at: **5:30, 6:00, 6:30**, or **7:00**

Time Survey

Child's Name _____

Please circle one time for each:
My child's bedtime is: **7:30, 8:00, 8:30**, or **9:00**

My child wakes up at: **5:30, 6:00, 6:30**, or **7:00**

Name:_____ Date:_____

Time For Bed

7:30 pm	**8:00 pm**	**8:30 pm**	**9:00 pm**

Time to Wake Up

5:30 am	**6:00 am**	**6:30 am**	**7:00 am**

Name:_____ **Date:**_____

Tally Chart

Bed Time	Number of Students
7:30	
8:00	
8:30	
9:00	

1. How many people go to bed at 8:00 or 8:30? _____
2. What time do most of your classmates go to bed? _____
3. What time do the least amount of your classmates go to bed?_____
4. How many more students go to bed at 8:00 than at 9:00?_____

Name:_____ **Date:**_____

Tally Chart

Wake Time	Number of Students
5:30	
6:00	
6:30	
7:00	

5. How many people wake up at 6:00 or 6:30? _____

6. What time do most of your classmates wake up? _____

7. What time do the least amount of your classmates go to bed?_____

8. Why do you think fewer people go to bed at _____?

_____

_____

PERFORMANCE TASK: Measurement Olympics

Approximately 2 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

MCC.1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have a variety of experiences with measuring objects with non-standard units prior to this activity. Remind students that when using nonstandard objects, each object should be placed end to end without overlapping or gaps.

ESSENTIAL QUESTIONS

- How are nonstandard units used to measure objects?
- How are measuring units selected?
- How is estimation helpful in measurement?
- How do measurements help compare objects?

MATERIALS

- Olympic Event Recording sheet
- Olympic Event Graph Sheet
- Olympic Event Task Cards
- Cotton Balls
- Paper worms
- Student created, non-standard measuring tools from previous lessons
- Mini Flipbooks (4 pages each, per student)
- Clock stamps
- *Length,* by Henry Pluckrose, or similar text

GROUPING

Individual

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Begin lesson by reading *Length,* by Henry Pluckrose (or similar measurement story.) As you read, discuss the questions and have students partner share how they would measure each object.

Review with the students the importance of using appropriate non-standard tools to measure objects. Review with students the various non-standard measuring tools they made or used during previous lessons (handprint strips, footprint strips, ladybug strip, worm strip, and any other tool that may have been created during other tasks). Lead a discussion that prepares students to make a decision about which non-standard measuring tool they will use for each event.

Each of the "Olympic Events" will allow the students to demonstrate their mastery of the measurement standards. The tasks and activities will be grouped as "Events." Students will rotate to all four of the Olympic events. Have students record their data on the Olympic Event recording sheets.

Part II
The teacher should arrange the events with enough room for students to complete the event with safety and accuracy. The teacher should model each event so that students are aware of the expectation of each event. The events could be implemented using small group rotations. Olympic Event Descriptions:

Event #1 – Wiggle Worms
The students will measure the length of their desk using paper worms.
Event #2 – Feather Blow
The students will blow a feather and measure the distance the feather travels, with unused crayons.
Event #3– Long Jump

The students will measure their longest jump using unsharpened pencils.

Event #4 – Cotton Ball Throw

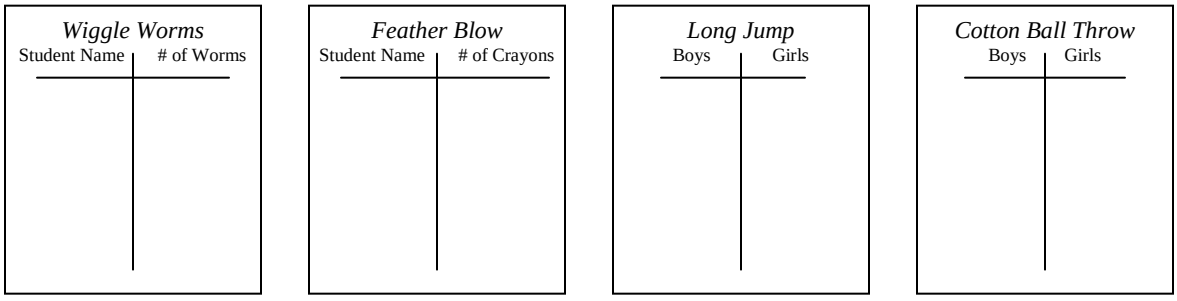
The students will measure the distance they can throw a cotton ball using markers.

Event #5 Events of the Day

The students will sequence a series of events, and assign a time of day which makes sense to them, to each event. They will justify their reasoning by writing an explanation for each time and selected event.

Part III

The teacher will post 4 pieces of chart paper at the front of the room for students to record their results. *(Sample charts below)* Students will record their Olympic Event data on a class charts at the front of the room.



Part IV

Gather students to a common area. The teacher will lead a discussion about each event. Allow students to compare results within each event.

FORMATIVE ASSESSMENT QUESTIONS

- What do you notice about the results from each event?
  Looking at the long jump results, I noticed that the boys jumped longer than the girls.
- How do you know that your measurements are accurate?'
- Is there anything that you would change about the way you measured the objects?
- Would you have selected a different measuring tool at any of the events? Why?
- What do the events all have in common?
- Which event do you think our class would do best in at the real Olympics?

Name _____ Date:_____

Olympic Event Recording Sheet

Event Name	*Measurement Estimate*	*Actual Measurement*
Wiggle Worms		
Feather Blow		
Long Jump		
Cotton Ball Throw		
Shoelace		

Measurement tool used:_____

Which event was your best event? Why?_____

_____

_____

Which event was your worst event? Why?_____

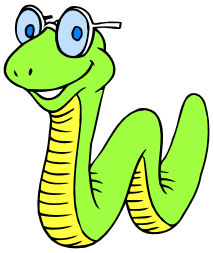
_____

_____

Event 1: Wiggle Worms

-Estimate how many wiggle worms it will take to measure your desk across the top. Record your estimate on the sheet.

-Lay the inchworms in a straight line across your desk. Count the number of inchworms you used and record on your sheet.



Event 2: Feather Blow

-Estimate how many crayons it will take to measure your desk across the top. Record your estimate on the worksheet.

-Put a feather at the edge of a table. Use this as the starting line. Blow the feather as far as you can.

-Mark the distance where the feather lands. Then measure the distance between the edge of the table and where your feather landed using unused crayons. Record on your sheet.

Event 3: Long Jump

-Estimate how many pencils it will take to measure as far you can jump. Record your estimate on the sheet.

- Use a piece of tape as a starting line. Stand with heels on tape. Jump the longest jump possible.

-Using pencils measure your jump and record the results.

Event 4: Cotton Ball Throw

-Estimate how many markers it will take to measure how far you can throw a cotton ball. Record your estimate on the recording sheet.

-Stand at the tape line on the floor. With one hand throw the cotton ball as far as you can.

-Using markers, measure the distance that the cotton ball traveled. Record the results.

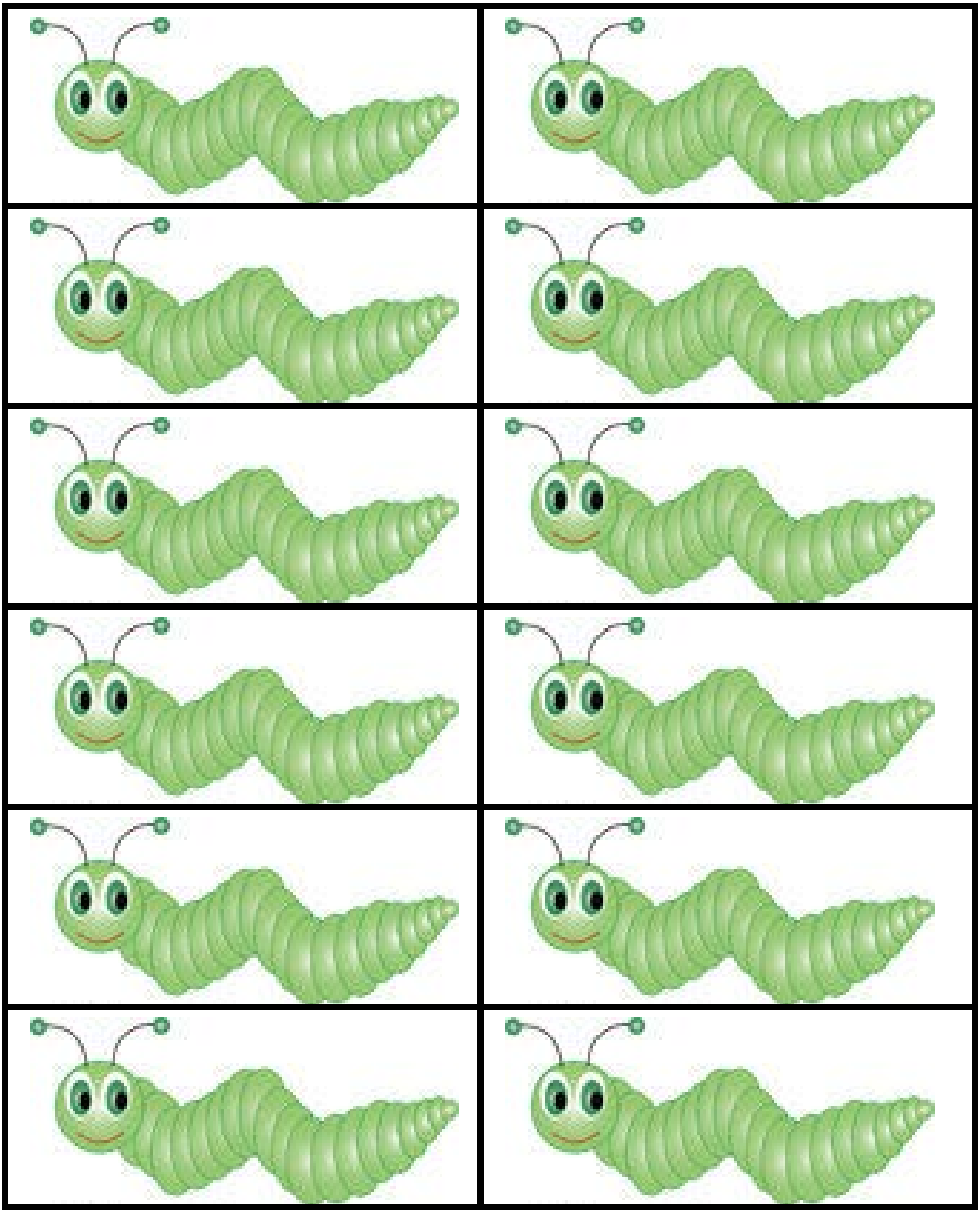
Event 5: Events of the Day

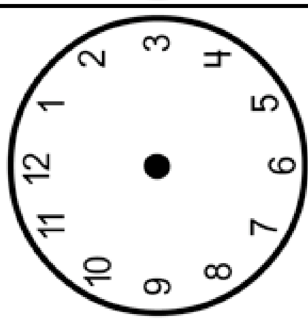
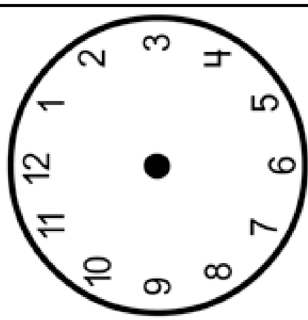
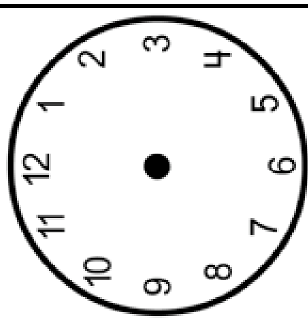
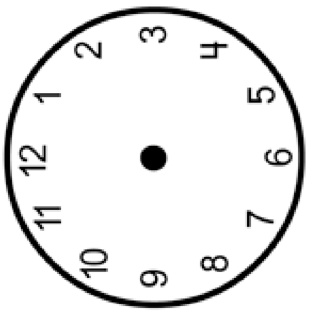
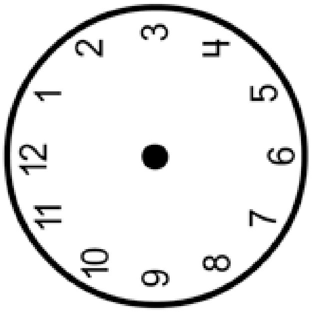
-Cut out each of the pictures and glue them to the task sheet under a clock.

-Write the time on an analog clock and a digital clock that you would participate in the activity during the day, for each event.

-Write an explanation that justifies your reasoning for assigning the time you chose for the each activity.

Measurement Olympics: Paper Worms



				
:	:	:	:	:
glue picture	*glue picture*	*glue picture*	*glue picture*	*glue picture*
Explain why the event could happen at this time. ______ ______ ______ ______	Explain why the event could happen at this time. ______ ______ ______ ______	Explain why the event could happen at this time. ______ ______ ______ ______	Explain why the event could happen at this time. ______ ______ ______ ______	Explain why the event could happen at this time. ______ ______